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1η εργαστηριακή άσκηση



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# Ecology 1

Ecology (from Greek: οἶκος, "house", or "environment"; -λογία, "study of")[A] is the branch of biology[1] which studies the interactions among organisms and their environment. Objects of study include interactions of organisms with each other and with abiotic components of their environment. Topics of interest include the biodiversity, distribution, biomass, and populations of organisms, as well as cooperation and competition within and between species. Ecosystems are dynamically interacting systems of organisms, the communities they make up, and the inorganic components of their environment. Ecosystem processes, such as primary production, pedogenesis, nutrient cycling, and niche construction, regulate the flux of energy and matter through an environment. These processes are sustained by organisms with specific life history traits. Biodiversity means the varieties of species, genes, and ecosystems, enhances certain ecosystem services.

Ecology is not equal with environmentalism, natural history, or natural science. It overlaps with the closely associated sciences of evolutionary biology, genetics, and ethology. An imperative focus for ecologists is to improve the understanding of how biodiversity affects ecological function. Ecologists seek to explain:

Life processes, interactions, and adaptations

The movement of materials and energy through existing communities

The successional development of ecosystems

The abundance and distribution of organisms and biodiversity in the context of the environment.

Ecology has everyday applications in conservation biology, wetland management, natural resource management (agroecology, agriculture, forestry, agroforestry, fisheries), city planning (urban ecology), community health, economics, basic and applied science, and human social interaction (human ecology). For example, the Circles of Sustainability approach treats ecology as more than the environment 'out there'. It is not treated as separate from humans. Organisms (including humans) and resources compose ecosystems which, in turn, maintain biophysical feedback mechanisms that moderate processes acting on living (biotic) and non-living (abiotic) components of the planet. Ecosystems sustain life-supporting functions and produce natural capital like biomass production (food, fuel, fiber, and medicine), the regulation of climate, global biogeochemical cycles, water filtration, soil formation, erosion control, flood protection, and many other natural features of scientific, historical, economic, or intrinsic value.

## Conservation biology 2

Conservation biology is the management of nature and of Earth's biodiversity with the aim of protecting species, their habitats, and ecosystems from excessive rates of extinction and the erosion of biotic interactions.[1][2][3] It is an interdisciplinary subject drawing on natural and social sciences, and the practice of natural resource management.[4][5][6][7]:478

The conservation ethic is based on the findings of conservation biology.

### Origins

The term conservation biology and its conception as a new field originated with the convening of "The First International Conference on Research in Conservation Biology" held at the University of California, San Diego in La Jolla, California in 1978 led by American biologists Bruce A. Wilcox and Michael E. Soulé with a group of leading university and zoo researchers and conservationists including Kurt Benirschke, Sir Otto Frankel, Thomas Lovejoy, and Jared Diamond. The meeting was prompted by the concern over tropical deforestation, disappearing species, eroding genetic diversity within species.[8] The conference and proceedings that resulted[2] sought to initiate the bridging of a gap between theory in ecology and evolutionary genetics on the one hand and conservation policy and practice on the other.[9] Conservation biology and the concept of biological diversity (biodiversity) emerged together, helping crystallize the modern era of conservation science and policy. The inherent multidisciplinary basis for conservation biology has led to new subdisciplines including conservation social science, conservation behavior and conservation physiology.[10] It stimulated further development of conservation genetics which Otto Frankel had originated first but is now often considered a subdiscipline as well.

### Description

The rapid decline of established biological systems around the world means that conservation biology is often referred to as a "Discipline with a deadline".[11] Conservation biology is tied closely to ecology in researching the population ecology (dispersal, migration, demographics, effective population size, inbreeding depression, and minimum population viability) of rare or endangered species.[12][13] Conservation biology is concerned with phenomena that affect the maintenance, loss, and restoration of biodiversity and the science of sustaining evolutionary processes that engender genetic, population, species, and ecosystem diversity.[5][6][7][13] The concern stems from estimates suggesting that up to 50% of all species on the planet will disappear within the next 50 years,[14] which has contributed to poverty, starvation, and will reset the course of evolution on this planet.[15][16]

## ECOSYSTEMS 3

An ecosystem is a community made up of living organisms and nonliving components such as air, water and mineral soil, all interacting as a system.[2] (However, ecosystems can be defined in many ways.[3]) The biotic and abiotic components interact through nutrient cycles and energy flows.[4] Ecosystems are the network of interactions among organisms, and between organisms and their environment.[5] Ecosystems can be of any size but one ecosystem has a specific, limited space.[6] On a larger scale, some scientists view the entire planet as one ecosystem).[7]

Energy, water, nitrogen and soil minerals are other essential abiotic components of an ecosystem. The energy that flows through ecosystems comes primarily from the sun, through photosynthesis. Photosynthesis also captures carbon dioxide from the atmosphere. Animals also play an important role in the movement of matter and energy through ecoystems. They influence the amount plant and microbial biomass that lives in the system. As organic matter dies, decomposers release carbon back to the atmosphere. This process also facilitates nutrient cycling by converting nutrients stored in dead biomass back to a form that can be used again by plants and other microbes.[8]

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| --- | --- | --- | --- | --- |
| LESSON | TOPIC | ASSIGNMENT | Points | DUE |
| 1 | What is Distance Learning? | Wiki #1 | 10 | March 10 |
| Presentation | 20 |  |
| 2 | History & Theories | Brief Paper | 20 | March 24 |
| SPRING BREAK | | | | |
| 3 | Distance Learners | Discussion #1 | 10 | April 7 |
| Group Project | 50 | April 14 |
| 4 | Media Selection | Blog#1 | 10 | April 21 |

Ecosystems are controlled both by external and internal factors. External factors such as climate, the parent material that forms the soil, topography and time have a big impact on ecosystems, but they are not themselves influenced by the ecosystem.[9] Ecosystems are dynamic: they are subject to periodic disturbances and are in the process of recovering from past disturbances that were external to the ecosystem.[10] Internal factors are different. They not only control ecosystem processes but are also controlled by them. Internal factors are subject to feedback loops.[9]

Class Schedule

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## ECOSYSTEM ECOLOGY 4

Ecosystem ecology is the integrated study of living (biotic) and non-living (abiotic) components of ecosystems and their interactions within an ecosystem framework. This science examines how ecosystems work and relates this to their components such as chemicals, bedrock, soil, plants, and animals.

Ecosystem ecology examines physical and biological structures and examines how these ecosystem characteristics interact with each other. Ultimately, this helps us understand how to maintain high quality water and economically viable commodity production. A major focus of ecosystem ecology is on functional processes, ecological mechanisms that maintain the structure and services produced by ecosystems. These include primary productivity (production of biomass), decomposition, and trophic interactions.

Studies of ecosystem function have greatly improved human understanding of sustainable production of forage, fiber, fuel, and provision of water. Functional processes are mediated by regional-to-local level climate, disturbance, and management. Thus ecosystem ecology provides a powerful framework for identifying ecological mechanisms that interact with global environmental problems, especially global warming and degradation of surface water.

This example demonstrates several important aspects of ecosystems:

Ecosystem boundaries are often nebulous and may fluctuate in time

Organisms within ecosystems are dependent on ecosystem level biological and physical processes

Adjacent ecosystems closely interact and often are interdependent for maintenance of community structure and functional processes that maintain productivity and biodiversity

These characteristics also introduce practical problems into natural resource management. Who will manage which ecosystem? Will timber cutting in the forest degrade recreational fishing in the stream? These questions are difficult for land managers to address while the boundary between ecosystems remains unclear; even though decisions in one ecosystem will affect the other. We need better understanding of the interactions and interdependencies of these ecosystems and the processes that maintain them before we can begin to address these questions.

## Conservation biology and restoration ecology 5

Restoration ecology may be viewed as a sub-discipline of conservation biology, the scientific study of how to protect and restore biodiversity, and restoration a part of the resulting conservation movement.

### Focuses

Though restoration ecologists and other conservation biologists generally agree that habitat is the most important locus of biodiversity protection, the disciplines themselves have different focuses. Conservation biology as an academic discipline is rooted in population biology. Because of that, it is generally organized at the genetic level, looking at specific species populations (i.e. endangered species). Restoration ecology is organized at the community level, looking at specific ecosystems.[9]

Because it is organized by species, conservation biology often emphasizes vertebrate animals because of their salience and popularity, whereas restoration ecology emphasizes plants because restorations begin by establishing plant communities. Ecosystem restoration is botanically based but does have "poster species" for individual ecosystems to get the public involved.[9] Since soils define the foundation of any functional terrestrial system, restoration ecology's ecosystem-level focus also results in greater emphasis on the role of soil's physical and microbial processes.[10]

### Theoretical foundations

Restoration ecology draws on a wide range of ecological concepts.

### Disturbance

Disturbance is a change of environmental conditions which interferes with the functioning of a biological system. Disturbance, at a variety of spatial and temporal scales, is a natural component of many communities.[11]

Humans have had limited natural impacts on ecosystems for as long as humans have existed, however, the severity and scope of our influences has accelerated in the last few centuries. Understanding and minimizing the differences between modern anthropogenic and "natural" disturbances is crucial to restoration ecology. For example, new forestry techniques that better imitate historical disturbances are now being implemented.[citation needed]

In addition, restoring a fully sustainable ecosystem often involves studying and attempting to restore a natural disturbance regime (e.g., fire ecology).

## Η οικογένεια μου